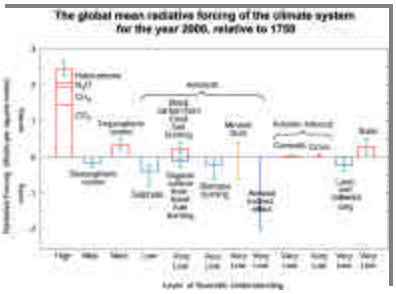
FY 2003 President's Request

Climate Change Research Initiative: Aerosol - Climate Interactions



Aerosols contribute to some of the largest uncertainties in understanding climate change.

The scattering effect of aerosols in the atmosphere can be seen in these pictures taken from the same vantage point.

What is requested?

In his June 11, 2001, speech at the Rose Garden, President Bush announced the establishment of the U.S. Climate Change Research Initiative (CCRI). Among the components of the CCRI are commitments to study areas of scientific uncertainty and to identify priority areas where investments can make a difference. NOAA will contribute to the interagency National Aerosol-Climate Interactions Program (joint with NASA, DOE, and NSF) currently under development to address key priorities in aerosol characterization and their role in climate.

Why do we need it?

Aerosols and atmospheric ozone play unique, but poorly quantified, roles in the atmospheric radiation budget (heat storage and release). This is, in part, because both aerosols and atmospheric ozone are short-lived and have uneven spatial and temporal distributions. The role of aerosols, minute particles in the atmosphere, in affecting climate is complex and current understanding is fragmented. Aerosols not only affect the atmospheric radiation budget, but also can affect cloud properties, which further impacts the radiation budget.

Current plans emphasize the importance of describing the distribution of all major types of aerosols, and their variability through time, the separate contribution of aerosols from various human activities, and the processes by which the separate contributions are linked to global distribution.

What will we do?

NOAA will establish new and augment existing field monitoring sites, including aircraft sampling, in and down wind of major population areas (e.g., Asia, Eastern North America, and South America) to establish temporal and spatial distributions, trends, and aerosol chemical and radiative properties. NOAA will also participate in focused field efforts and appropriate laboratory experimentation to assess the importance of aerosol concentration and composition on cloud properties and precipitation. Contributions will be made to modeling efforts aiming to integrate aerosol chemistry and physics with transport in order to evaluate sources and sink

The impact of aerosols on climate change is much less understood than that of greenhouse gases.

A variety of equipment and sensors will be used to study aerosols.

processes. Finally, in collaboration with the NOAA Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office, NOAA will advance the development of algorithms and sensor calibration / validation plans for the NPOESS planned measurements. NOAA will also coordinate its efforts with field measurement and model development programs.

What are the benefits?

Aerosols pose the largest measurement uncertainty in projecting climate change and are believed to have climate impacts comparable in magnitude to greenhouse gases. Greenhouse gases are monitored to high precision compared to aerosols, which allows accurate calculation of annual and decadal changes in their impacts on climate. In contrast, aerosols are not measured accurately enough to determine their impacts on annual or decadal scales. In the absence of this information, it is not possible to define optimum policies to address global climate change or to assess options in limiting anthropogenic influences on climate.

The difficulty in measuring the effect of aerosols on climate and identifying its anthropogenic component is primarily due to their heterogeneity. Different compositions can have opposite radiative effects. For example, sulfates cause cooling, whereas black carbon causes warming. The proposed efforts have emerged from a conviction of the science community that successful determination and monitoring of the anthropogenic effects on climate requires an integrated aerosol program. We note that this interagency approach to monitoring, modeling, and understanding the climate influence of atmospheric aerosols is complementary to ongoing and proposed research examining the influence of aerosols on human health in the context of current and prospective air quality standards.

For more information:

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NOAA Budget	FY2003 Change $ millions
Climate Research	
Climate Observations and Services	
Climate Change Research Initiative	$18